

12th Issue

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# BIMarabia



What is BIM

BIM Applications Corner

A Systematic Understanding of BIM

Understanding BIM Nodes (BIM fields)

## A Dream!

Revit Automated Tool Kits

Use of BIM in Construction Phase

BIM Execution Plan

Obstacles of BIM Implementation in  
the Region

Mental Storms

**Omar Selim****Eng. Sonia Ahmed****Eng. Motasem Albanna****Eng. Khalid Othman****Eng. Maisoon Alsorori**

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### **I have a dream...**

That is to use the BIM technology in making detailed open-source models for the buildings of the refugees, that anyone can download them and print them with a 3d printer using the land soil without any economic or racial conditions due to their suffering in their home countries, making this come true will save the cost, effort and time of building thousands of structures...

Alastair Parvin founder of (WIKIHOUSE) in a TEDx talk had stated that the challenge we are facing is all about the methods of building and developing equipment, infrastructures and facilities for social economy for architecture. This can be resolved with open source programs and few years back this was being developed and seen in our lives by the open source printers. This can be done (To actually build these tools) by using an open source shared scripts using a 3D printer -which is really interesting isn't it? - When you suddenly have an open source 3D printer that its parts can be printed on another 3D printer by itself. He continues "The idea is to make it possible for anyone to go online and access a freely shared library of 3D models which they can download and adapt in Sketch up. Almost at the click of a switch, they can generate a series of cutting files, which allow them in effect to print out the parts from a house using a CNC machine and a standard sheet material like plywood. The parts are all numbered, and basically what you end up with is a really big IKEA kit." This will save huge amount of time, effort and skills needed. This by all means is revolutionary; challenging the idea of the money saver but typical sized product. We are heading to a future where the manufacturer is everybody, everybody is a designer. Whenever any ideological clash or a war arises it really comes down to one main issue "Who's the one controlling the manufacturing?" well, maybe the answer is simple; no one, everyone should be the manufacturer using earth's raw materials and developing environmental synchronized architecture to be. Parvin stated "High end architects are working for the higher class, the 1% , now it's time for us to think about how can we work for and approach the remaining 99% and this is what building information modeling will help achieving with the help of open source materials, maybe in the future citizens can develop their own cities by themselves"

# What is BIM?

## Building Information Modeling

It is a process in which the information of the building during its life time is produced and managed. This type of modeling includes different design items as elements (Ambiguous not being known or given any property may they be solid or hollow) then these elements is assigned geometric and technical properties and given parameters and conditions describing their relationship with each other. Then comes the viewing stage of these elements then their documentation using various design tools that use BIM technique; one can generate different plans and views of the building for further documentations. These elements are only defined once, and through the BIM application their views are generated and collaborated automatically with each other with no mistakes. This eases the design process and is much better than drawing each view on its own as a standalone file.

This process is typically executed using a dynamic 3D modeling program in real time .Its produces a model full of information about the building which includes different geometrical and geographical information, quantities of materials and all the components of the building, it can also include the interior aspects of the building such as furniture and finishes with a link to directly inquire about their price and order them for execution. This workflow is considered more practical and efficient than the typical inquiring and inspection of the construction cost, also it eliminates many errors during execution as any clash between the same or different discipline is previously reviewed during the building's design stage using BIM.

The model will also be synchronized with the actual building during its execution which helps managing the building and performing regular inspection and maintenance. Using the parametric relations of the modeling process allows the modeler to control each element alone taking into consideration the relation between elements and each others so if any element is changed and it's in a parametric relation with another element both elements will be affected by this change in design, and also the BIM application may refuse some changes as it produces illogical or misfit relations between said elements.

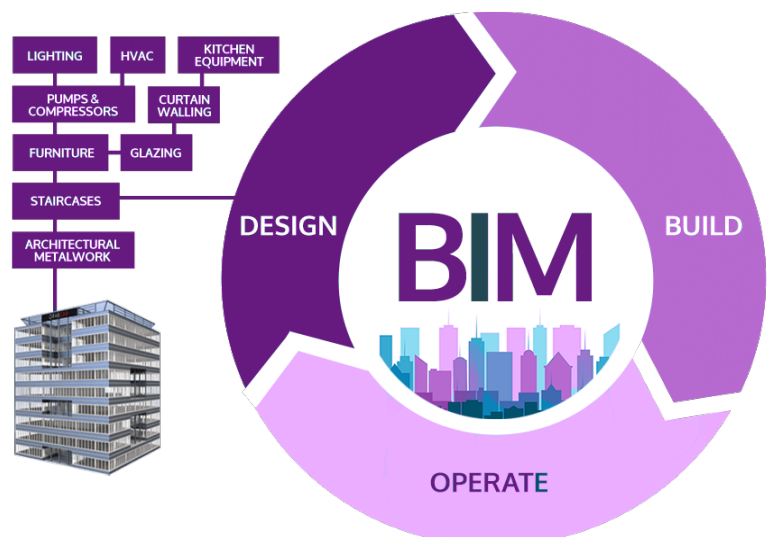


Fig1. An integrated model resulting from the design stage by using BIM.





### *Snippets Around the World:*

How awful is it nowadays to watch this picture of people trying so hard to be on schedule by manually drawing and documenting the mechanical parts?

This picture was taken in year 1942 at one of the FORD factories in the US which drafting and designing various parts took place as shown, modern day computers never existed back then and it took ages for AUTOCAD to first come into existence (After 40 years in 1982). It came out as shown in this picture:



## **Necessity is The Mother of Invention**



Omar Selim



Ahmed Abd Elbary

# Virtual Reality

Previously, We have discussed the virtual reality “VR” and augmented reality. Both of these technologies are received warmly. Virtual reality is awaited to be the second technology application having an impressive impact on changing the world. According to a survey conducted by The Scientific American Magazine, the first was artificial intelligence and the second one was VR. where nuclear fusion and genetic engineering had lower records.

Even if these two technologies, virtual reality and artificial intelligence, have a great glory, no monthly published issues can catch up with the great progress developed by scientists.

Nowadays, we have a real Virtual Reality.

We have a dilemma, How can we recognise the world around us?

Are they the five senses? What if we could manipulate our five senses to see, hear, touch, taste and smell a specific environment? Can we simulate what an old man feels including sight weakness?! Would that be useful for doctors to telepresence what patients feel?! Can VR simulate the feelings and emotions of the astronauts or zero gravity?

Imagine that you are in an olympic ring Fighting Muhammad Ali! Imagine that you are on Titanic simulating the experience they had, tasting the salty water on your lips and even how cold the water was!!

This technology is a simulation as we had in Matrix and Avatar movies, when anyone can sit on a chair and totally experience another world.





Fig.1. virtual reality

Using VR, You can simulate a building visitor feelings, explore whether this visitor would be comfortable with air conditioner, materials texture and painting odor or not. The building owner will be able to simulate his life in that new building even before the site excavation.

We also can train the workers and technicians on dangerous cases such as earthquakes and fire alerts, the thing which will help them act better in real cases.

In “The Metaphysics of Virtual Reality”, Micheal Heim presents us with. Seven divergent concepts of VR research. The different views have built camps that fervently disagree as to what constitutes Virtual Reality.

These seven concepts are simulation, interaction, artificiality, immersion, telepresence, full-body-immersion and network communications.

Currently, we are going in very progressive steps to this approach. Nowadays, there are games which let us interact with game content.

### VR compatible devices:

- Head-Mounted Display “HMD” has existed since 1995 by Ivan Sutherland.
- Data gloves that bring intuitive interaction to Virtual Reality.
- IR cameras that help computers tracking your body movement.
- VR computing unit backpack for data processing.

Now, we need to know more about this technology and develop it in order to maintain our position among nations.

“To follow the path:  
look to the master,  
follow the master,  
walk with the master,  
see through the master,  
become the master.”  
- Zen Poem

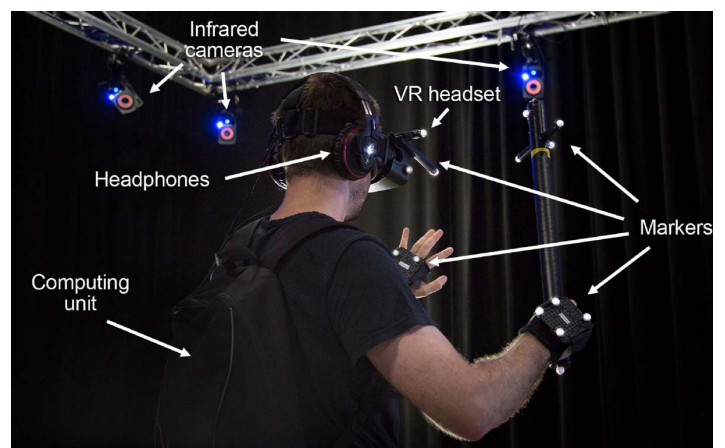


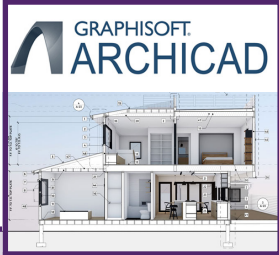
Fig.2. Some devices support virtual reality





## 1: ArchiCAD:

It was developed by Hungarian company (Graphisoft). Its features were enhanced by Apple Mac. Company in 1982. It gained wide fame at that time. It had been known as the first drawing program on PC that could create 2D and 3D drawings at the same time. Currently,



more than 100000 architects use it in buildings design.

## 2: Vectorworks:

Distinctive and easy program, it could be compared to ArchiCAD. Architectural and landscape drawings are made easily by it.



# BIM Applications Corner

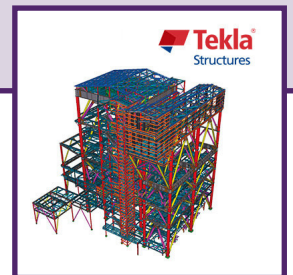
## AECOsims Building Designer



## 3: AECOsims Building Designer:

Distinctive and integrated (architectural – structural – electromechanical) group developed by Bentley company, which developed the famous program Micro station. Some companies use this program with special codes and standards of them.

## 4: TEKLA:



The most important program in the structures field, especially the steel structures. It has a huge library of sections and bolts which is compatible with different codes and environments. It enables the user to create special sections with different and various ways, according to the desired work.



**Dr. Bilal Succar**

**I**t is hard to put a specific definition for BIM. If we only try to discuss it with a colleague in this field - More likely - perhaps it will end up discussing infinitely overlapping topics

For example, if we begin to discuss BIM's effects on industry, we will end up comparing Software solutions. Or the topic will begin with how to collaborate on a digital model, then the discussion will shift to argue risk reduction versus risk sharing, insurance coverage and design fees. It doesn't stop there; if we try to explain how a small company can convert from a two-dimensional to three-dimensional system to implement BIM, the discussion will be uncontrollably shifted for model servers and integrated practices. This confusion is not only revealed at the level of individual practice but is widely shown in presentations, main principles, writings and specialized discussion forums, just google the term "BIM" and read the many conscious and unconscious articles on this subject. To highlight this whole issue, try reading the discussion below which I've written from six different highly informed sources:

BIM is considered as a catalyst for change (Bernstein, 2005), that was developed to reduce industrial fragmentation (CWIC), improve its efficiency / effectiveness (Hampson and Brandon 2004) and reduce its high cost of inadequate interoperability (NIST, 2004). BIM is a methodology for managing the basic design of the building and project data in digital form throughout the building life cycle. Penttila (2006). Building Information Modelling is a new approach to describe and present information required for design, construction, and operation of facilities.

Only by reading the text written in bold for the few resources listed above (taken from hundreds of definitions and Confirmations)

BIM is sound like a Super TLA - the last three letters, which are abbreviated and defined as nothing in particular.

One question remains, what if BIM is something you can buy from the store? Is it a process of change or building procedure?

Is BIM a GSA requirement, a national BIM standard or what exactly??  
 If BIM was all what said before, is not it true that the breadth of its definition is inversely proportional to its value?



Fig 1 BIM's recurring topics

Faced with all this chatter about BIM, the stakeholders at AEC (architecture, engineering, construction) will find it difficult to shed light on exactly what they need to do to gain the promised benefits from BIM. The chatter makes the process of change seems harder, more complicated and extended than it should be. This should not be the case at all.

In order to make BIM topic more clarified, a systematic analysis of BIM domain must be performed, which in turn will result in a clear and systematic description for everything that is BIM, not only this but also how to apply this in an incremental and steady way. To analyse simultaneously and then understand the loosely defined concept of BIM, we initially need to divide it into its components and analyse the relationship between them. This is what will be presented in the upcoming BIM episodes.

Based on my next research (academic and professional), I will try to simplify the discussion by analysing the term BIM into three integrated dimensions:

BIM Fields: Players and Results.

BIM stages: evolutionary steps.

BIM Lenses: Multidisciplinary analysis.

I will later use these three dimensions to generate some BIM steps - those incremental steps

Are needed for moving the work from 2D toward an integrated practice.

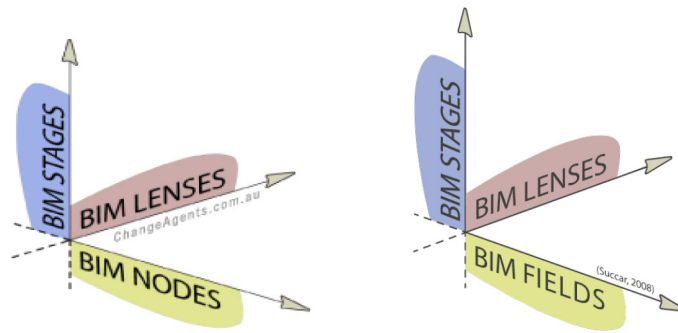


Fig 2 Demonstrates the framework for BIM

Continued, the next episode deals with talking about the first dimension - BIM domains

#### :Reference

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# Understanding BIM Nodes (BIM fields )

By: Dr. Bilal Succar

The confusion occur in discussions and implementations of BIM can be dramatically reduced by systematically analysing concept (that is larger or greater than life). We'll do that by subdividing Building Information Modelling into its basic components and then connect them to each other in a meaningful and useful way. As discussed in Episode 6, there are three dimensions to BIM discussion. The first one is what I call BIM fields – BIM circles if you want – and it's responsible for identifying industry's stakeholders and their deliverables. The other two dimensions, BIM Stages and BIM Lenses, will be discussed in following posts.

So what do these BIM Nodes (now called BIM fields) represent and why are they needed?

The Architecture, Engineering and Construction (AEC) industry includes a great number of 'industry players': owners, designers, regulators, builders and product/service providers. These 'industry players' in turn will create even a greater number of 'industry deliverables': designs, specifications, tools, construction products and specialised services. With careful inspection, all these players and deliverables can be gathered into three circles (Fig.1):

**The BIM Policy circle :** includes all players responsible for generating standards, guidelines and contracts. These include AEC institutions, educational institutions and others like them.

**The BIM Process circle:** includes all players directly responsible for delivering buildings and other construction products: schools, bridges, shopping centres, etc... These include owners, designers, contractors and whoever is involved in a project's lifecycle.

The BIM Technology group: includes developers of tools necessary for creating and managing building information models and other design and construction technologies. These include software developers, equipment suppliers and product/service providers active within the AEC industry.

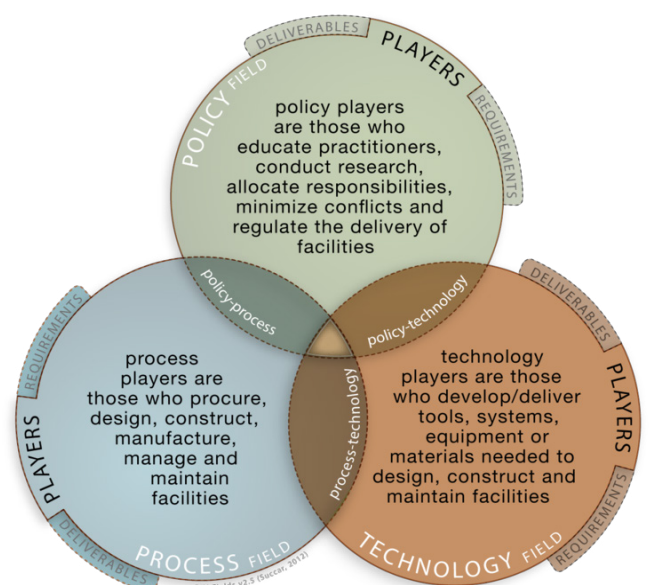


Fig 1 : the BIM framework includes three interlocking Fields (circles) - Updated May 10, 2016 [http://changeagents.blogs.com/.shared/image.html?/photos/uncategorized/2008/02/01/bim\\_policy\\_process\\_and\\_technology\\_n.png](http://changeagents.blogs.com/.shared/image.html?/photos/uncategorized/2008/02/01/bim_policy_process_and_technology_n.png)

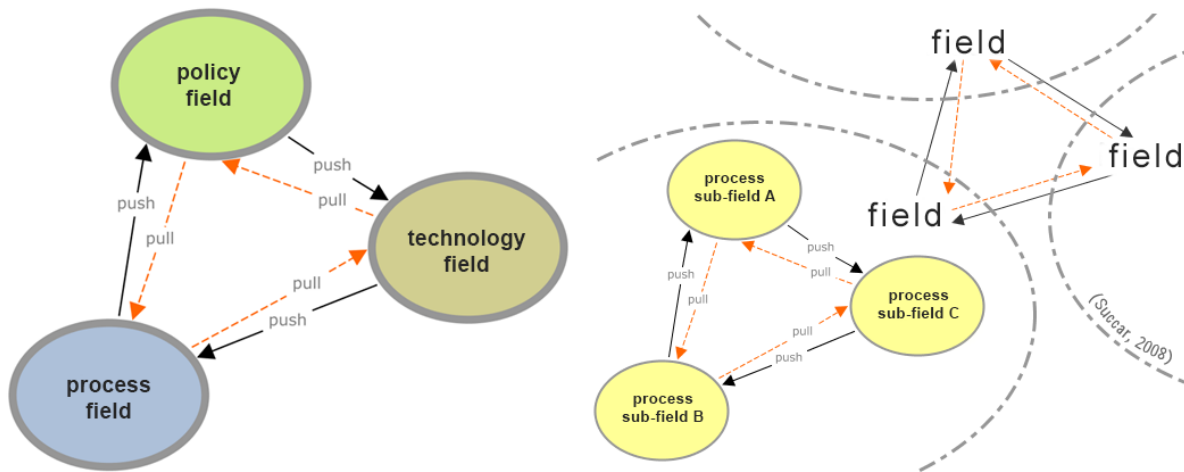


Fig 2: Push-Pull interactions between industry players (External and Internal respectively) - Updated May 10, 2016 ( [http://changeagents.blogs.com/.shared/image.html?/photos/uncategorized/2008/02/01/bim\\_node\\_interactionslogo.png](http://changeagents.blogs.com/.shared/image.html?/photos/uncategorized/2008/02/01/bim_node_interactionslogo.png))

Every circle includes a particular set of players who interact with each other and with players within other circles. As an example, Designers interact with Builders to generate Facilities– this is an internal interaction within the Process Node. Also Designers interact with Fire Authorities and other Regulatory authorities to insure conformity with the standards and codes – this is an external interaction between Process and Policy Nodes. Both types of interactions take the form of Push-Pull transfers between players (Fig.2). We'll discuss product and knowledge transfers' in other posts but for now we will consider ALs (Architect Instruction) and RFIs (Request For Information) as two examples of this push-pull behaviour.

BIM Nodes and sub-nodes not only interact but they also overlap. Overlapping occurs when players or groups work (or need to work) together to form a joint industry body (think of RAIA, IAI and similar organisations) or generate a joint industry deliverable. As an example, Policy and Technology circles overlap when their players work together to generate interoperability standards (IFCs are a striking example). Also, all three nodes overlap (or need to overlap) to generate National or International BIM Guidelines.

So the importance of BIM Nodes – the first dimension of the BIM framework - lies in identifying interactions and overlaps between industry players. Once identified, it will be much easier to generate better modular manuals and more comprehensive BIM guidelines.

The below attached link contains a video that explain BIM fiels (previously BIM nodes), updated July 20, 2015.

# *Project Management and BIM*

*BIM Arabia team in Abu Dhabi met and interviews the Chief Operator officer of Ahmed El-Mazroui group and general administrator of Al Turath. Engineer Mohamed Nazar.*

*This interview was about construction management and the future of BIM in construction fields.*

*Firstly would you please introduce yourself?*

Firstly I would like on behalf of all Turath and Ahmed Mazroui group to thank BIM Arabia allowing this wonderful opportunity for this interview and getting to know our office better and its interests concerning BIM and engineering field generally.

I am Eng. Mohamed Nazar COO of Ahmed Mazroui group, assigned to supervise the management process of many Engineering firms belonging to the group in Abu-Dhabi.

*Can we get to know better the projects you've supervised yourself?*

Our firm is participating in many projects in many engineering disciplines: Architectural, structural and electromechanical, in addition to environmentally friendly services and infrastructure works. Our firm has a very big experience and history which allowed us to deal with many governmental, semi-governmental and private sectors and get involved with many huge projects be it Landscaping and planning or maintenance or design of various fields also getting involved with PMC and project management all of this is included in our scope for ages now...

*What are the most important projects taking place in Emirates right now?*

There are some leading projects taking place right now here or over the globe, on our firm's level we made man memorable and unique projects like EDCO projects, a petroleum leading company and is considered a strategic project. Also ADNOC distributions projects which give materialistic services to the population like gas stations, also man development projects like REEM islands in Abu Dhabi. Along with many more mega projects well known and heard of in Emirates like Harbors, transportation facilities, infrastructures and special structures (Malls, Towers, Bridges...etcetera).

*There are always errors or clashes in the project's work plane be it before execution or during execution...In your opinion what is the main factors leading to these clashes?*

Certainly, these clashes and errors will always make a fuss and is an occurring obsession in the execution sector, when a project is getting bigger with complicated and overwhelming details synchronization and coordination between different disciplines becomes hard and tricky and many errors start to rise from such malfunctioned coordination and out of sync, we tend to control these out of sync errors having a coordinator.

Something that helps reducing clashes and errors during design stage is the usage of some applications specialized in coordinating and clash elimination. This will effectively help site engineers as it is known that the execution phase is very sensitive to any clash and change, elements that are being executed must be executed with proper precision and coordination with no clashes or differences in design documents avoiding time delay or redesign or any problems between owners, contractors and consultants. These problems unfortunately give a bad impression about the consultancy office and its performance during design.

*What are the main challenges and problems in the constructions sector?*

There are many factors governing the constructions scene some of which is the availability of working individuals, sufficient resources and human resource management. When it comes to the technicality; the very precise accurately done designs with no flaws or errors will always be among the most important factors for a good construction process and vice versa, when we are dealing with missy inaccurate design sheets outcome will be anything but a good construction process.

*Do you think new technology and applications in the field can help with these problems? What about the human resources working on these projects?*

This subject is also related, now applications are widely used and integrated in the constructions scene, when we are dealing with small scaled projects it becomes easy to control and deal with errors in these projects, but when projects are of a big or huge scale it become harder to control or mitigate some errors or miss-coordination, this is when we need to use some technology, applications are widely used to control the scene be it material take off or as inspection tools.

When it comes to design whether it's still preliminary or early tender sheets or finalized executive sheets applications will help drastically managing these processes. This directly affects the rate of employment and using the human resource needing very educated and technologically friendly individuals to deal with these applications correctly,



because as known no application can handle the job alone, thus, being technologically aware of these applications and their best practice is considered now the main factor of being important to the scene. Having a basic background of an application and what it does is something and having actual experience with it is another thing entirely.

*During these few years a new subject has become very famous which is building information modeling (BIM) and many firms started applying it in Dubai, what are your plans in order to implement this new technology?*

To answer this question we have to look into two major aspects:

The first aspect: If BIM technology is directly required in order to submit our work to a specific facility or a project owner, so we are obligated to use this workflow whether or not it is important.

The second aspect: If we really feel the need to use this flow regardless of whether if it is an obligation from the owner's facility or not.

Certainly many project holders and owners in Emirates ask the consultants to use BIM in their project work, in such cases we are obliged to use it. Or as it is the case now the governmental officials in order to certify and officially document a project it requires it to be done using BIM workflows.

But internally, we also feel the need to apply BIM applications and executive plans not only because it is required or getting famous, but also because it eliminates many problems that take place during design or execution due to misfit coordination or out of synch errors as we previously elaborated. Using BIM is now considered essential to deal with coordination errors, it's becoming the major concern when using BIM to coordinate well between disciplines and detect clashes I know, but there are also many amazing features for BIM reducing effort and enhancing the presentational process to the clients, or making a very accurate and precise executive sheets. In my opinion whether clients and owners are asking firm to implement BIM in their projects or not, we must use this technology to be always updated in our field and reduce effort and time by avoiding errors and clashes and benefiting from the various production styles and visualizations that can be done using BIM.

We must also hint that Consultancy offices rarely do want to develop their workflows or seek new technologies due to economic issues, in the private sector you will rarely find anyone wanting to update their workflows, may be in governmental or semi-governmental facilities.

But in our office, due to the instructions given by our CEO Eng. Ahmed El-Mazroui we are developing our workflows and styles continuously which gave us an opportunity to apply and use many new applications and programs, this is very good for the firm as we also have the capable team to handle new tools be it BIM technology or anything new.

***Do you agree that BIM should be applied broadly in the projects on hands at your firm right now even if no instructions were giving from any authority?***

Firstly, even if any authority asked for the use of BIM we should be well trained and ready.

Secondly, we are noticing an immediate need to implement this technology to mitigate clashes.

Thirdly, implementing BIM helps us to advertise our office because being updated is considered a big step within this field and comparing us to near offices.

***What do you think about new features as 3D printing, Virtual reality and Augmented reality is there any market available for such modern devices in Emirates?***

Emirates market as a consumer for technical services, when it is compared by any other market over the globe is considered a first class and always up to date, in spite of many other well developed and modern countries still Emirates market is remarkable and have many first class technical services, I think having these modern devices for our market is natural and I may not be surprised, and there are many international projects taking place here that demand such techniques and devices we really found that out in different fairs around here. Emirates is just different and always up to date unlike many other countries that requires time until they decide to use some new techniques.

***How do you think the future AEC and management will hold and be shaped by using these new techniques?***

We are firm believers that using new technologies will always be an advantage and we have always placed bets on that from the very beginning, up to now new technology never disappointed us, our production is always developing and being enhanced. And applying new technologies won't stop there; newer devices and more modern and developed applications will always be there just as any other industry over the world, specially the tech field and informatics, now every industry is depending on computing units and technology. Physical and mechanical methods cannot compete with technological and electronic devices and applications in the Engineering field.

*Is there any last word you would like to add up?*

I would like to praise the effort and participation of BIMArabia in this field, it helps firms generally to keep up with newer techniques and use newer applications moving on into another new stage of enhanced products and savings. I think this is a very positive attitude and I hope it continues we hope to keep contact with our firm and any other firm in order to encourage firms to use new applications and techniques.

*BIMArabia: Lastly we would like to thank Eng. Mohamed Nazar so much letting us to have this delightful and constructive interview we hope that this will further develop our connection and collaboration with him and make further interviews about project management and BIM applications.*

*Eng. Mohamed Nazar: Thank you so much and I wish that AlTurath office will be an effective element regarding your efforts and vision, helping you in achieving this vision and take notes of your advices and news you publish by your side.*

*Written by: Mohamed Nezar*

*Translation by: Mohamed El-Sayed*



Dr: Noha Saleeb  
Sarah Marashly



## BIM Projects' Risk Management and Assessment (2)

**In** the 10th issue I talked about general ways to deal with the risks formed in any construction project using BIM. Whereas in this issue I will discuss in details the risk types in the life cycle of any construction project using BIM and proposals for solutions.

As a quick review of what has been addressed, we have said that the risk management process is summarized in four steps:

Identify ... analyse ... manage (action)... evaluate (monitor)

Risk management:

1. To identify the risk type, we can use the following:
  - Mindmapping or Brainstorming
  - Ishikawa Cause and Effect (Fishbone) diagram,
  - ) )Workflow Flowchart
  - SWOT
2. To analyse risk types, two characteristics must be identified for each risk :) Likelihood of Risk and Severity of Risk. Then Risk Register
3. Risk Process: There are five basic ways for risk management:
  - Avoidance
  - Elimination
  - Reduction
  - Retention
  - Sharing
4. To assess risk management:
  - Indicate the success levels of the executed solution by the use of the Key performance indicators



- Gain Ownership for Risk Management
- Plan and report
- Signoffs from Risk or Management Committee/Department

Detailed risk types in BIM projects:

The following are detailed risk types that may be included in the BIM project throughout the project life cycle and some

Solutions to address:

1. Specifications are not clear, Employer's Information Requirements, and clarity of quality of deliverables

To manage this risk:

- Conduct collaboration meetings between all stakeholders at the beginning of the project to make all the requirements in details.
- Establish quality assurance and control and audit checks, and signoffs and validation at different stages of the project.
- Compare with previous projects for accuracy and completeness of information using geometric databases, non-geometric and cloud-point data
- Agree on the forms of documents, drawings and lists that will be used term plates and checklists, since the beginning of the project.

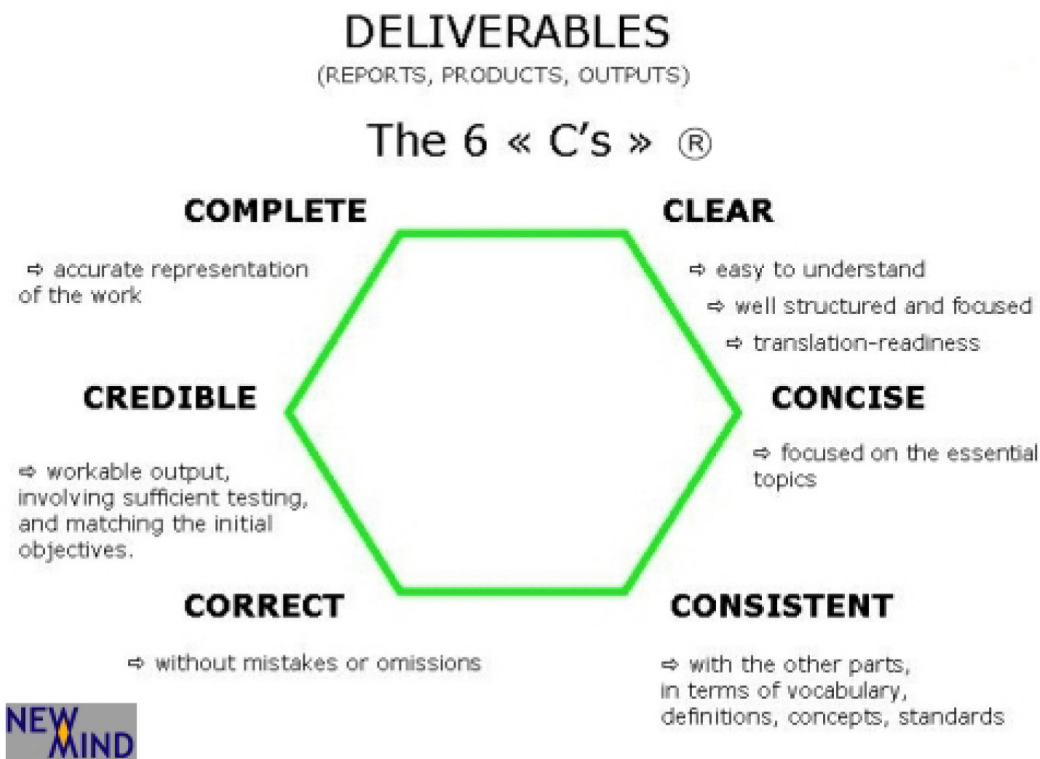


Fig.1 Characteristics of information required to avoid the risks of lack of clarity

2. Lack of evidence to support supply chain expertise in BIM project and suitability of these experiences with the requirements of the project.

### To manage this risk:

- Establishing training courses for the supply chain at different levels and electronic information portals to answer questions related to the project

- Conducting questionnaires and interviews to identify suitable staff

Of the project to ensure the level of expertise, skills and information (Skills Knowledge Expertise)

In the BIM

- Appointing an expert / consultant (BIM champion) to work out a strategic plan for business training

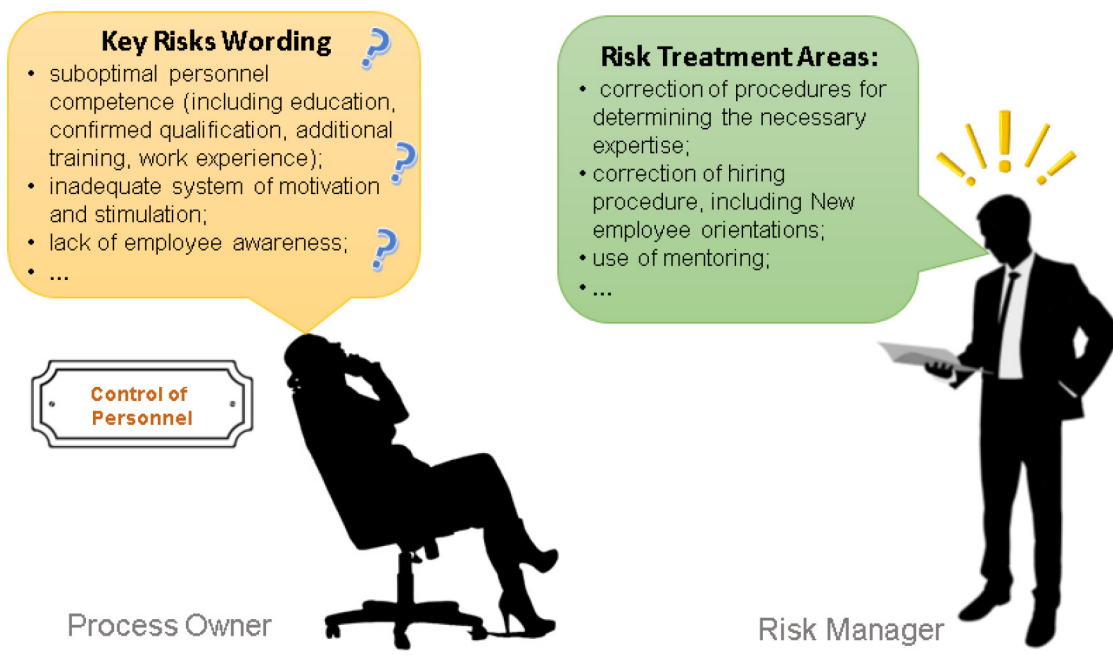
Workflows (using BIM

- Ensure the documentation and clarity of the achievements required by the project)) clear documented delivery

(bles) have a supply chain to avoid any misunderstanding or appreciation during the project

- Access to references from previous clients (client references), case studies

Previous case studies, and goals achieved.



**ISO 9001:2015 cl. 4.4.1.f; 6.1.2.b.1**

**Fig2 How to avoid the risk of having no expertise to work with BIM**

3. Not to update 3D models and their 2D exports because of changes in design or lack of collaboration between different project parties

**To manage this risk:**

- The verification of designs, non-geometric information and detect clashes between project elements.
- The establishment of a periodically monitoring system to log out forms, board, e-mails, information and documents of all types, which are in the common data environment CDE.
- Schedule update of data archive, forms and project documents
- The use of file naming conventions, which are recognized in international standards Standards (such as BS1192, including version and file status)
- Schedule meetings of cooperation between the project teams and record their decisions, results, and recommendations with the verification of the implementation of the previous through the Common Data Environment CDE...

4. Wrong path of information and consequently errors of construction work on the site  
To manage this risk:

- The use of the Integrated Project Delivery IPD (IPD) for participating all the project parties to share the gains, losses, and risks; and thus reduce their impact on the results Profits
- The communication and the properly project information and documents transportation such as EIR, BEP using systematic approach in international standards such as the PAS1192 series
- Proper hierarchy of supervision, verification and signature of works during design and implementation
- The use of daily work reports to prevent claims for financial claims
- The use of NBS Digital Toolkit to organize and manage the BIM project details and components

5. Incidents and inaccuracies of technology (software, scanners, cloud points etc.)

**To manage this risk:**

- Backup information in safe and sparse locations
- IT support
- Give appropriate access rights to prevent accidental or intentional tampering with

information; and cyber security measures

- Review information within 3D models after exporting files using IFC exchange which sometimes causes the corruption of certain geometric elements
- Making insurance policies against the risk of losing information due to technology problems
- Creation of Contingency plans if any part of the software hardware or equipment fails
- Regular updates of files.

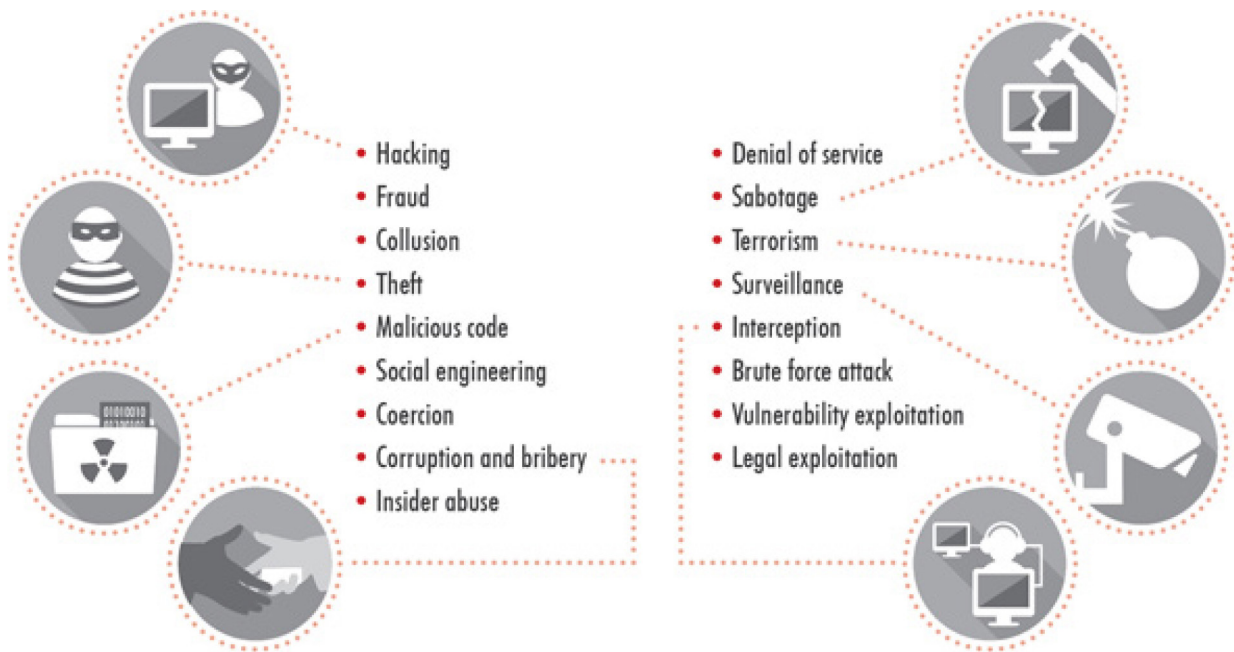


Fig.3 Technological threat types that may threaten BIM project information

6. Contracts between the project parties: the risk of non-compliance with contract terms such as payments, quality and time

To manage this risk:

- Provide bank guarantees (from the contractor to the owner to ensure compliance with the business process) and appropriate insurance policies
- Establishment of the Project Bank Account (PBA) as a payment channel in construction projects to ensure payment to contractors in the supply chain on contractually agreed dates
- Use unbiased arbitration and appropriate sanctions as clear clauses of the contract
- Periodic reviews to ensure compliance with contract terms
- Use the Integrated Project Delivery IPD (IPD) to include all the project parties in the implementation of the terms of the contract to ensure the realization and sharing of profits

7. Lack of accuracy in the information provided in bids and tenders such as the estimation of quantities and costs



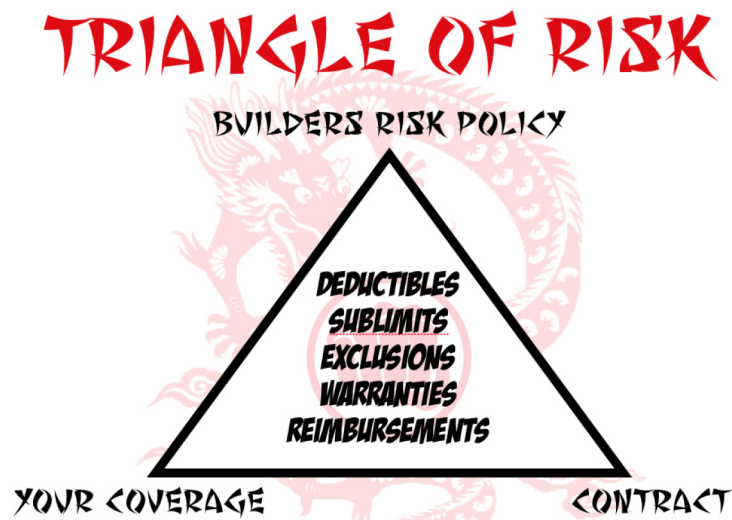


Fig.4 Triangle of Risk

To manage this risk:

- Division of business accounts using the characteristics of bills of Quantities Scheduling in specialized BIM programs to minimize human errors, with considering adjusting the properties of geometric elements that may cause errors such as axes alignment, taking into account the levels of ceilings and their calculated layers, openings, etc.
- Allowance rates in the accounts in anticipation of design changes at an agreed rate, high prices, or inflation and currency exchange.
- Identify the quality of the elements required to avoid changes that may have significant impacts on prices
- It is necessary to agree in advance on how to calculate any changes requested by the owner in the terms of the special contract and the general design or material types etc. (eg. variations and change orders). A maximum percentage of adjustments? Are quantities re-measured at the end of the project?
- The calculation of delay in the supply and storage problems and other logistical

#### 8. Delay in schedules.

To manage this risk:

- Using the Critical Path Method and Float to find alternatives to modify timetables
- Determining the penal conditions of the contract when any delay occurs
- Periodic recording in form of reports on achievements and results
- Ensure that safety and security measures are put in place to maintain project personnel, raw materials, and equipment, as this is one of the most important reasons to disable schedules until resolved
- The calculation of delay in the supply and storage problems and other logistical difficulties.

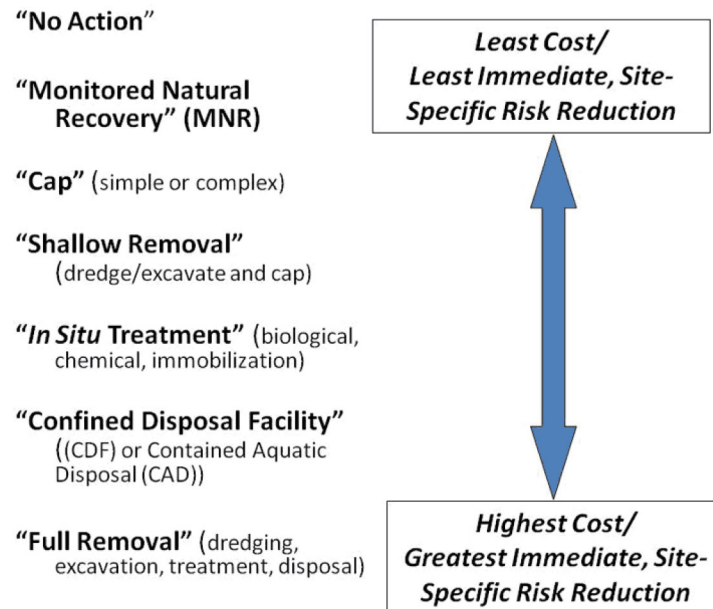


Fig.5 Some types of onsite risk solutions

9. Low staff morale, which may affect the track and the quality of the work.

To manage this risk:

Assessing staff and rating them for easy identification of their needs through Maslow's hierarchy of Needs.



Fig.6 Contract risk management

- Conduct a case study for the employees and study the reports by the personnel specialists
- Provide incentives and offer them to employees
- Establish social events to strengthen the relations between workers and encourage cooperation between them.
- Acknowledge the administration about the internal problems of the company due to the lack of sufficient skills that not only affect the performance of the individual but his desire and loyalty to work. Therefore, a budget should be allocated for training and raising the level of employees
- Rationing the task team for ease of management.
- Reducing the complex management structure so that managers can communicate easily with their subordinates
- Stability to support the sense of safety in work
- Determine roles and responsibilities accurately so that there is no confusion between responsibilities or neglect of any of them

- Development of Key Performance Indicators (KPIs) and periodic reports to compare employee performance.
- Establishing a code of conduct to be followed by all employees to determine the business dealings between all members.

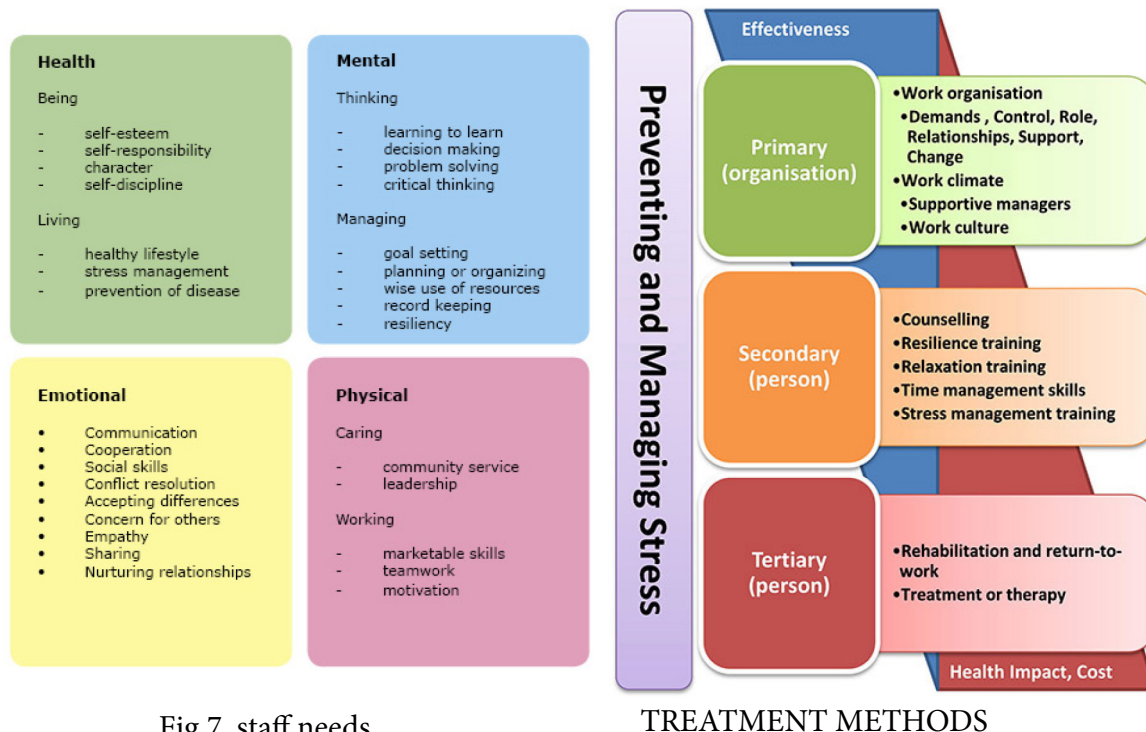


Fig.7 staff needs

TREATMENT METHODS

## 10. Red marks in risk assessment and treatment

- General and Specific Conditions are not defined accurately in Tenders and Contracts
- There is no list of items listed or excluded
- The definition of costs is unclear, for example, the recoverable costs as if part of the General Conditions Costs
- Lack of availability of services and infrastructure related to the project (Infrastructure) or the existence of obstacles under soil requires sores and scans
- Status of Statutory Clearances
- Difficulty of resettlement or rehabilitation requirements if the project land is not empty
- Site Accessibility
- Negotiation of Offtake Arrangements to secure the future production or distribution market

Of the building prior to the construction of the origin

- Credit Risk of off taker

This article reviews the aspects and models of the risks of BIM projects, but as some of these risks are formed due to the emergence of modern BIM techniques and methods of work, but other are traditional risks that can be in any construction project as a result of the lack of complete development currently in the construction industry.

# Revit Automated Tool Kits

Written by : Omer Selim

Translated by: Mohamed El-Sayed

## Plug-ins and Add-ins

Plug-ins or add-ins are tools added into the Autodesk Revit to enhance and improve its functions adding new features to facilitate the overall modeling procedures, it can always be found in most of the new programs such as VRAY for visualization.

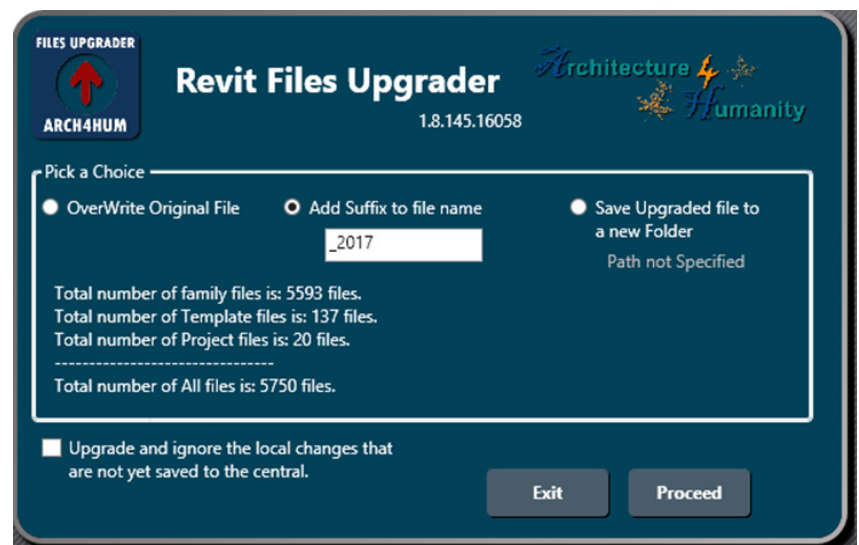
Some of the Arabic-oriented add-ins are shown in this topic showing better support for the Arabic Engineering rank.

- *Files Upgrader*

This tool kit is for updating the Revit file to a 2017 file version.

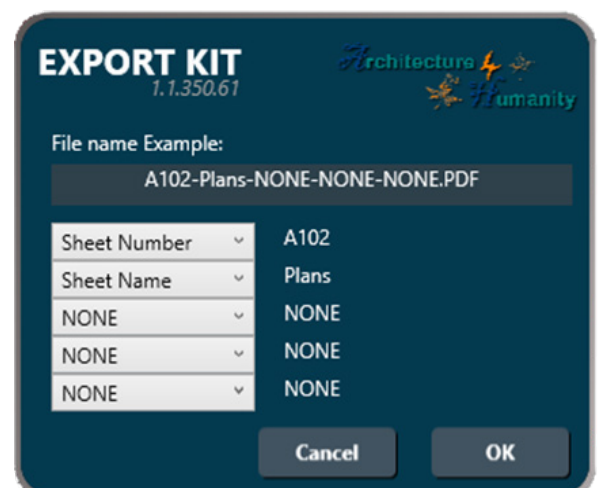
Programmed by Eng. Mustafa Khalil.

<https://apps.autodesk.com/en/Publisher/PublisherHomepage?ID=200906181623652>



- *Export Kit*

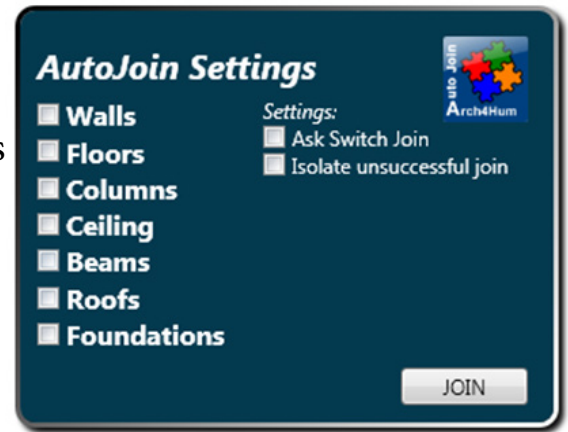
This tool kit aims to export sheets from Revit





- ***Auto Join All***

This tool kit is for automatic joining of walls to beams and slabs.



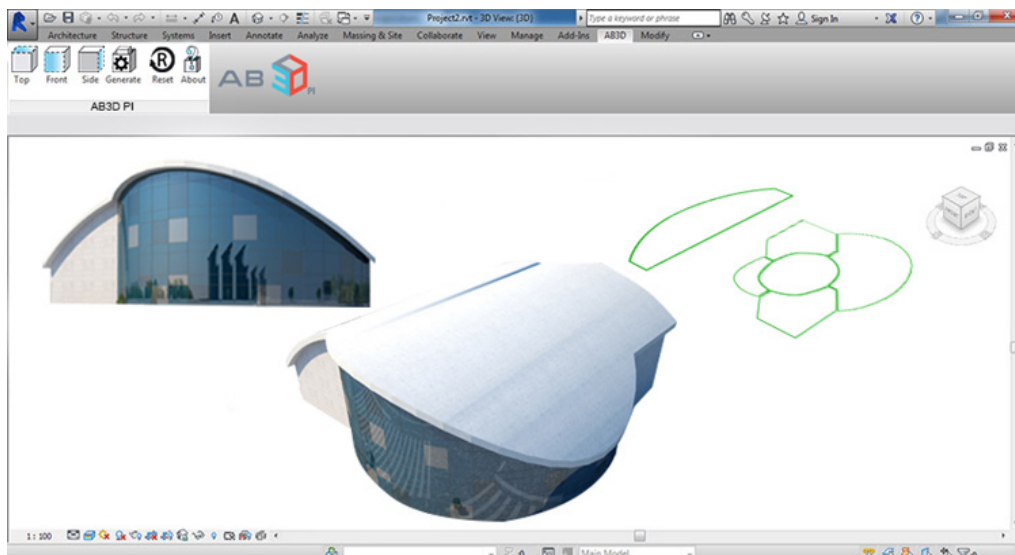
- Automatically assigning a Revit column over an AutoCAD column indication by selecting the columns corners.

Download: <http://enrvision.com/build/ENRVisionEnrColumnPro.zip>

Illustration: [https://www.youtube.com/watch?v=hIB3P83\\_jXw](https://www.youtube.com/watch?v=hIB3P83_jXw)

- Drawing an isometric model by drawing its plan and side-views.

Visit: <http://ab3dlabs.com/>



\*\*\*\*\*

# Use of BIM in Construction Phase

Part 2: Material Management

Written by: Mohammed Hamad

Translated by: Mohamed Ghattas

Material management starts from the design phase, the resource management or the follow-up during the construction. The designer has the priority in material selection due to the available options of the shape and color of the required design standards according to the owner requirements.

The team starts modeling the building and extracting the inventory tables. It is extracted from the BIM programs to determine the material prices and quantity required for the period of the project and the date of receipt. The contractor is responsible for the request, quantity, storage, delivery time and alignment of the schedule depending on the project level to ensure the continuous flow of the project cash flow.

The idea of material management:

The follow-up is done in several ways, including QR code sticker (as shown in Fig 1). These systems have advantages and disadvantages because all available information in building modeling and systems such as cloud must be provided by the owner, contractor, and consultant. And shared through a server like what is applied in large projects.

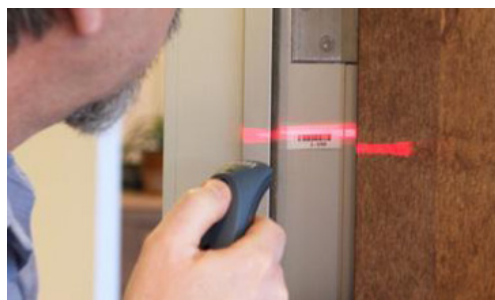


Fig 1:Barcode

A previous research study was carried out:

1- GPS and UWB:

GPS, RFID and UW technologies had been used. Thus provides solutions for locating materials, accurate implementation, operation, total cost, and operability (Song, Mohammed et al. (2015). And then proposing solutions to cost reduction and reducing waste materials, and usage of several sophisticated and contemporary methods.

I. Use barcode (serial numbers of all materials).

II. Long-term use of GPS in large-scale projects to know the storage locations (as

shown in Fig 2), which helped productivity and increased performance.

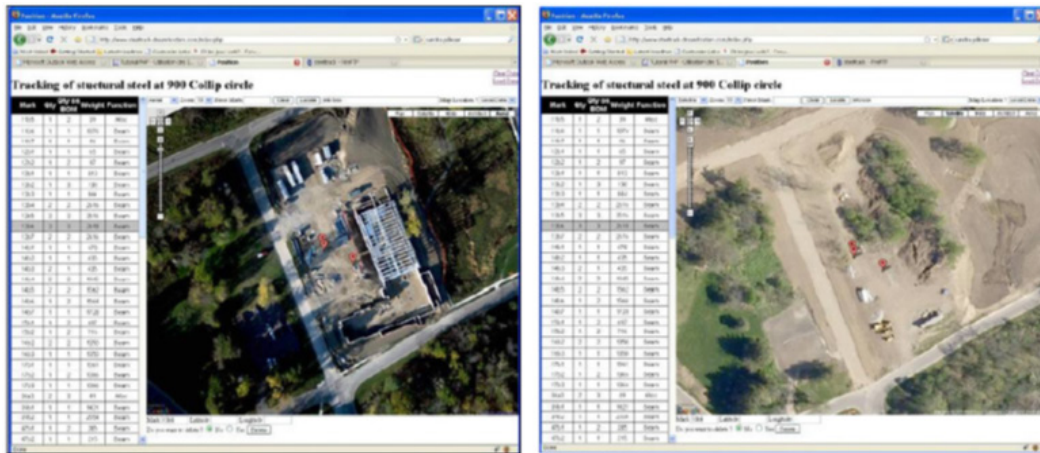


Fig 2 long term use of GIS in large-scale projects

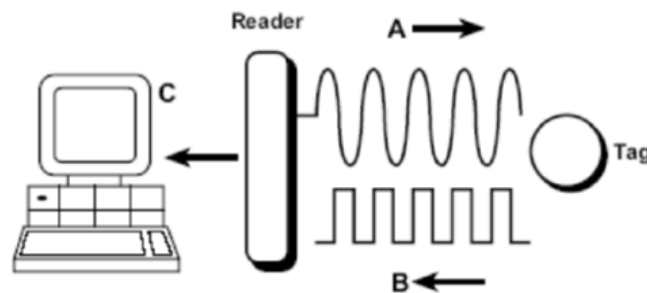


Fig 3 Radio-frequency identification

## 2. RFID (Radio-frequency identification):

The idea of using RFID technology used in the animal world (as shown in Fig 4) as an identification card. The RFID contains a battery which helps to send independent signals and the signal is transmitted to the reader. Each RFID have a separate frequency and specific symbols to determine its location and details. The researchers have proved the effectiveness of using RFID chips in the delivery of materials through identification cards and the follow-up of construction equipment (Sattineni and Azhar 2010).



Fig 4 RFID

The follow-up is not limited only to materials, in addition to the crew members of the construction site (as shown in Fig 5), which is one of the main concerns in the field of construction and safety requirements. The actual value is to avoid falling into events that threaten the labor lives (as shown in Fig 6) and provide a safe work environment. In addition to RFID, Bluetooth technology and the safety systems are applied to avoid accidents and follow-up work efficiency (Elhami Nasr 2013). Also, determine the location of labors and the heavy equipment. And the proportion of individuals approaching heavy equipment locations.

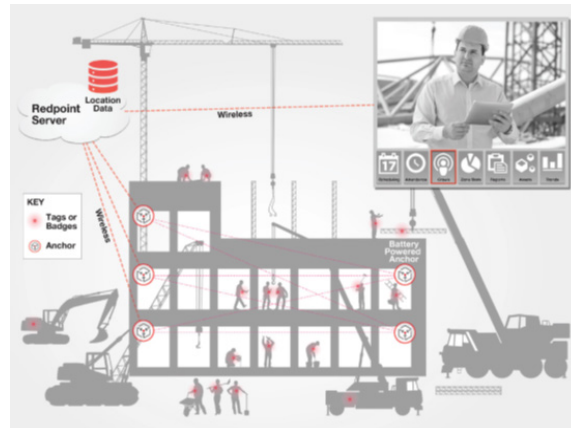


Fig 5 Follow-up staff members within the site.



Fig 6 A man passing by a US bridge construction site in Atlanta on Saturday fell into a muddy area and was almost entirely submerged

## Reference

- Elhami Nasr, P. D., PMP; Tariq Shehab, Ph.D. and Ana Vlad (2013). «Tracking ».Systems in Construction: Applications and Comparisons
- Sattineni, A. and S. Azhar (2010). «TECHNIQUES FOR TRACKING RFID TAGS IN A BIM MODEL» International Symposium on Automation and Robotics in Construction
- Song, L., et al. (2015). «A Cost-Effective Material Tracking and Locating Solution for Material Laydown Yard» *Procedia Engineering* 123: 538-545
- <http://www.slideshare.net/JuliaMcNally/tracking-workers-and-assets-in-construction>
- <http://www.constructionweekonline.com/article-16206-video-man-cheats-death-/in-muddy-atlanta-accident>





# BIM Execution Plan

A document written for BIM management during the project that identifies the project outputs beside the followings:

- The goals we want to reach
- The standards that the whole team will work on
- The Software that are going to be used
- Identifying the stakeholders; Know who is responsible, who is the owner, who will be influenced or affected by the project, and how we will deal with them
- Meetings: how it will be and when.
- Project delivery how it will be; is it requiring a model or shop drawing.
- Project Characteristics; the number, size, area and location of buildings.
- Shared Coordinates; Identify the common point between the different sections
- Data Segregation; Specify the powers to access data
- Checking / Validation; Determine the method of examination of the project and when.
- Data Exchange; Specify how data is exchanged.

Definitely all these points are subject to compliance, during the contract, with the environmental practices that are concerned with preserving the environment and governmental conditions.

The required and the capabilities of the team will be specified, and then divide the required into parts and to ensure that everyone is working towards achieving the goal. It will be written twice:

**First:** Before signing the contract and will contain the main titles.

**Second:** After signing the contract and will be more detailed.

### The most important benefits of BIM implementation plan:

- Communication: Encourages direct communication between the project parties
- Collaboration: Provides tools to collaborate at the same time
- Data exchange: Provides data exchange at the same moment from the first time
- Time saving: Help implement schedule

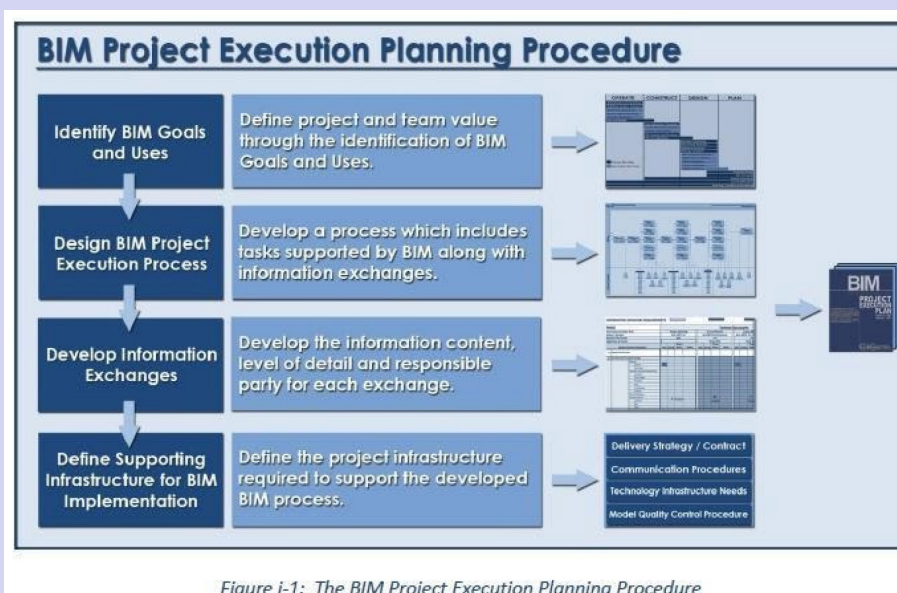
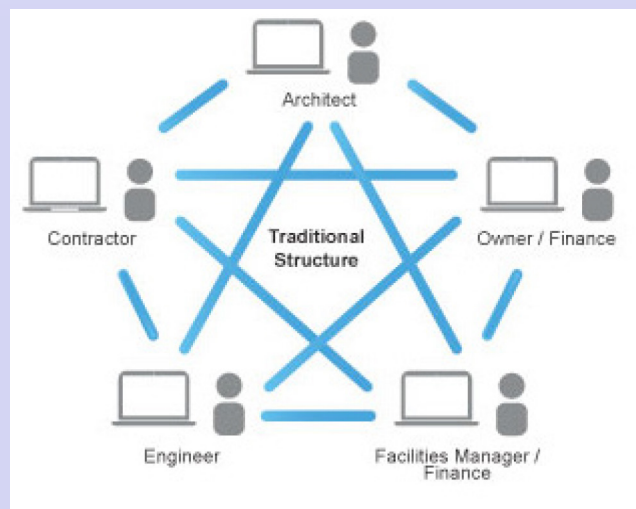


Figure i-1: The BIM Project Execution Planning Procedure

## The most important points:

- Project information

Project Name
Project Address
(.Project No. ( Client Project N. or Reference No
Contract Form
(Project Description (EIR
Project Brief and CDM requirements

- **References we will work on:**

It is important to have references so we can return to them anytime, like:

AEC (UK) BIM Technology Protocol v2.1

AEC (UK) BIM Protocol – BIM Execution Plan v2.0

AEC (UK) BIM Protocol for Autodesk Revit v2.0

AEC (UK) CAD Standard for Layer Naming v4.0.2

BS 1192:2007

PAS1192-2:2012

BIM Overlay to the RIBA Outline Plan of Work May 2012

Dublin Institute of Technology (School of Surveying and Construction Management)

BIM Forum

CIC

CPIx

- **Key BIM Stakeholder:**

those who are Influencing the process of the project and their names and means of communication with them.

Function	Name Company	Individual Named	Role
Client	Big Time Developments	John Walls	Client
Client Rep	Pentagon BIM Consultant	David Solutions	BIM Leader
Designer	ROH Architects LLP	Bill Murray	Design Leader / Principal Designer
Designer	ROH Architects LLP	Sarah Smith	BIM Design Leader
Designer	ROH Architects LLP	John Cane	Information Manager
Contractor	Build Alot Ltd	Phil Brick	Principal Contractor

- The Team, the job titles, and the skills needed in every person.

Company name	Representative and Authorised Responsible Agent	Role
A	xxxxx	BIM Manager
B	xxxxx	Lead designer
C	xxxx	Project Manager
D	xxxx	Information Manager
E	xxxx	Task Team Manager
F	xxxxx	Task Team Manager

	Strategic						Management				Production	
Role	Corporate Objectives	Research	Process + Workflow	Standards	Implementation	Training	Execution Plan	Model Audit	Model Co-ordination	Content Creation	Modelling	Drawings Production
<b>BIM Manager</b>	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N
<b>Coordinator</b>	N	N	N	N	N	Y	Y	Y	Y	Y	Y	N
<b>Modeller</b>	N	N	N	N	N	N	N	N	N	Y	Y	Y

- The project requirements.

BIM USE	Yes or No
3D Coordination	Yes
As Built Records	Yes
Building Maintenance Schedule	Yes
Building System Analysis	Yes
Clash Detection	Yes
Code Validation	Yes
Yes Construction Sequencing	Yes
Cost Estimation	Yes



Design Review	Yes
Digital Fabrication	Yes
Disaster Planning	Yes
Drawing Production	Yes
Energy Analysis	Yes
Engineering Analysis	Yes
Engineering Analysis	Yes
Existing Conditions Modelling	Yes
FFE Specifications & Schedules	Yes
Lighting Analysis	Yes
Mechanical Analysis	Yes
Other Engineering Analysis	Yes
Programming	Yes
Quantity Take Off	Yes
Record Modelling	Yes
Scheduling	Yes
Space Planning	Yes
Structural Analysis	Yes
BREEM	Yes

- The program's names that are used and their versions.

Company	Database	CAD Software	Version	Format	Comments
Architects		Revit Architecture	2016	rvt.	For architectural Model
		Navisworks Manage	2016	,nfc. ,nwd. nwf.	Model federation and clash detection
Structural Consultants		Revit Structure	2016	rvt.	For Structural Model
		Navisworks Manage	2016	,nfc. ,nwd. nwf.	Model federation and clash detection
MEP Consultants		Revit Structure	2016	rvt.	For MEP Model
		Navisworks Manage	2016	,nfc. ,nwd. nwf.	Model federation and clash detection
BIM manager		Revit	2016	rvt.	For BIM Model
		Navisworks Manage	2016	,nfc. ,nwd. nwf.	Model federation and clash detection

- The validity.

Company	Authorized manager	Authority (Upload, download, change access/ Distribution)
Lead consultant		Upload, download, change access, distribution
Structural engineer		Upload/ Download
MEP engineer		Upload/ Download
Design build contractor		Upload/ Download/ Distribution

- The file types that will be delivered.

	DWG	DGN	DWF	PDF	IFC	Other
Models					* .	RVT. NWD.. NWF.RVT. NWD. NWF
Drawings	* .	* .	* .			
Final drawing format				* .		
Schedules or spreadsheets						xlsx, COBie.

- Delivery dates.

Start Date	Design Completion	Detailed Design Completion & Fabrication	Construction	Asconstructed Models, Documents & Data	Handover
April 2012	* .				
February 2014		* .			
July 2014			* .		
September 2016				* .	
December 2016					* .

**BIM** is no longer an option nowadays. Many of the Gulf and Western countries had enhanced the existence of those engineering administrative systems by legislation (1) or that their real estate companies explicitly request their use in their projects.

I will not speak intensively here about the returns that come from the use of this technology, which produces a new pattern of Management systems properly because there is not enough space for it.

It will be enough to tell you that it gives a disciplined management of time with an expectation that applies to reality for both costs and on-site works with a reduction near zero for the lost time that result from lack of coordination between disciplines in the design stages and executive plans.

I will talk here from different points of views; I will talk from the designer's point of view and on-site contractor's point of view. And from the perspective of each of them within Egypt and the Gulf market.

**The first obstacle:** no one from the business owners and the employees got a hand in it, the economic and political climate of the region is never getting the right time to implement a new way in engineering management.

The decline in oil prices in Gulf, the accompanying slowdown in business, and the criteria for assigning unclear projects in the region does not make competitiveness. With pressures like these, we, now, may understand why Firm owners or senior executives may refuse to apply new methods of work.

# Obstacles of BIM Implementation in the Region

By: Omar Alshaik

It saves time and changes in location, and it predicts cost and increases the coordination between different disciplines in all stages of the project..... Is not that enough???

However, the most important question is what hinders the implementation of this technology that may deprive those, who fail to master it individually or at the corporate level, to catch up with the tomorrow's world.

But believe me there is no choice for you; not applying means death through years that counted on fingers of one hand. You may become a new Nokia in your field if you do not develop and realize what the era may impose and what the Legal requirements for the markets in which they compete may impose.

**The second obstacle:** is the internal resistance of employers that may limit their impacts on new technology or of those who do not understand the long-term impact of technology and the need to apply it.

And here lies the responsibility of employers to qualify those employees, retain them and their expertise that will not be compensated, and find a place for them in the system, because there is not any technology that can be applied away from technical standards and application experience that cannot be lessened by days.

**The third obstacle:** is the cost that is needed by applying new technology, the cost of computers that will differ in the quality of what had been used in traditional systems, and the cost of individuals training or the cost of recruiting new employees for their experience knowledge, since those people are a little. Of course, that obstacle does not appear in the Gulf as it appears In Egypt. Besides, it does not show to the contractor in the same violence that the designer faces for reasons of financial capabilities and the expected returns from business.

Unfortunately, I cannot find a solution to this problem, but the good thing is that it is related to the cost that goes under the main expenses which means it will not be counted on one project but the institution will take it once and will be useful for a large number of projects later.

**The fourth obstacle:** is the confusion between the executive plans, the old design, and the new stages which I mean here is LOD 400 versus Shop drawing and LOD 300 versus Design issued for construction

Company	Database	CAD Software	Version	Format	Comments
Architects		Revit Architecture	2016	rvt.	For architectural Model
		Navisworks Manage	2016	,nfc. ,nwd. nwf.	Model federation and clash detection
Structural Consultants		Revit Structure	2016	rvt.	For Structural Model
		Navisworks Manage	2016	,nfc. ,nwd. nwf.	Model federation and clash detection
MEP Consultants		Revit Structure	2016	rvt.	For MEP Model
		Navisworks Manage	2016	,nfc. ,nwd. nwf.	Model federation and clash detection
BIM manager		Revit	2016	rvt.	For BIM Model



The walls are an example of progress levels between different levels of BIM. The designer used to form plans with unprofessional level of coordination and leave that job to construction engineers in site, but BIM is recognized only by taking out a full model that is ready for implementation on the site which means it transfers the cost of coordination to the designer and provides enough time from contractor time and project location.

But in order to get the project, the designer adheres to traditional time and the client demands the traditional time, and this brings us to three paths:

A loss to the designer and more load of working hours in order to get the job done properly or formed as a model by BIM technology but with traditional work quality.

When it is written in the contract that the implementation will be done by BIM technology, the solution is solved because the best gets the project, and when the project is designed and implemented for the same authority, there is no interest conflicts.

However, when the situation is loose, there is no choice for the designer except to put his own standards according to the client requirements and show what he may provide to the client if he/she gradually increases the quality of the model.

Or to quickly increase the staff efficiency for reaching rates close to the rates of production of CAD which is possible but requires investment at first.

This technology is like a river; it carries a lot of good but those who resist may drown in its traditional sands. It just need a decision, an understanding, listening ears and a thinking mind that strategically earns long-term gains.

# Mental Storms

By : AbdulHakeem Tala'at

Any participant in BIM has recently realized that there are many concepts and criteria, that are specific for the sequence of work and coordination between different departments, have been followed for many years but not appropriate for this new system if we are keen to implement it in an integrated and smooth way.

Because of the limited resources that can be used for applying this new system, there is only the research, experience, error, and the question of experts and practitioners in this area, and perhaps one of the best methods is to attempt to collect a number of ideas contributed by a number of individuals to the problems posed, examine these ideas, and then evaluate them for getting the best solutions; this is called mental storm.

The first one who developed and defined this concept (the mental storm) is Alex Osborn in 1953 in his book called (Applied Imagination).

There are general rules that control the process of mental storm for producing a lot of ideas and increasing the overall creative process in the group, these rules include:

1. Assign one team member to act as a leader and introduce the elements of the problem and organize ideas and solutions.
2. Focus on the quantity Regardless of the quality of each idea. It is through large quantity that quality is created; the greatest number of ideas increases the chances of having strong and effective solutions.
3. Prevent criticism at the beginning of putting solutions, to avoid shyness and fear of forming ideas, in which the participants should initially focus in expanding and adding many ideas, besides delaying criticism for later in the criticism phase.

4. Welcome all ideas, even the unusual ones, in order to obtain a broad and long list of ideas,

Unusual ideas can play an active role in non-traditional solutions that provide a lot of time and effort, the mental storm is based on the freedom of thought, where there is no maximum and no limits to ideas and solutions.

5. Combining and developing ideas, because the goal is not to have a single point of view but to combine good ideas to form a better idea. All the ideas formed are owned by all so that an idea may be used and developed without taking permission from anyone even from the owner of the idea.

### **The mental storm goes through several stages:**

1. Clarify the problem and analyse it into elements.
2. Conceptualize the solutions by engaging the audience with as many ideas as possible, as they firstly work individually, then will discuss the work as a group, getting benefits from the individual ideas, to reach shared thoughts and ideas.  
This stage begins by reminding the head of the session of participants of the rules of brainstorming, the necessity of commitment, and the importance of avoiding criticism and accepting any idea and follow-up.
3. Evaluate solutions and choose the best ones.

We will discuss a number of mental storms that have already taken place over a number of successive episodes:

The next episode will be entitled “Coordination of work between architect and construction engineer at the design stage”

Dear reader, you can enhance this episode with participating your thoughts by applying the stages of the mental storm by the following:

#### **Phase I: conflict clarification and its components**

- shared responsibility between architect and structural engineer in reference elements (levels and axes)
- shared responsibility between the architect and structural engineer for some structural elements of the building, such as construction tiles, the structural columns, the concrete walls, and the openings
- Where to build a shared responsibility component, is it built in the architectural file or structural file
- How to distribute or change responsibility between the architect and the structural engineer through different stages of the project
- How to track changes and match the architectural and structural models with the least human intervention that is possible to reduce errors.

#### **Phase 2: Visualize solutions through readers' participation**

Dear reader, within 20 days of issuing this edition, you can develop a vision and offer ideas to solve the problem

Please send these ideas and solutions to this email: [BIMARABIA@GMAIL.COM](mailto:BIMARABIA@GMAIL.COM)

#### **Phase 3: Evaluate solutions and choose the best ones**

All the ideas sent will be studied and sorted, besides those that were suggested before, and will be evaluated by experts in the field, the valuable ideas will be set in the next edition with proposal of the best solutions.

## Conclusion

Thanks to God and his mercy,  
Through 12 versions of the first Arab magazine specialized in BIM,  
The journey is still sustained and will continue to raise the degrees of  
thoughts and ideas,  
This is only a small effort; we always seek perfection in it, and we have  
done our best to make it our goal  
If we make mistakes we have the honour of trying and learning  
We do not say more than what Imad al-Isfahani had once said:  
I saw that a man will never write a book without saying if I changed  
this, it would have been better, if I left this, it would have been nicer,  
and this is one of the greatest lessons on all human beings that all are  
seized by imperfection ..  
And finally after we have progressed smoothly in this broad area  
We hope to be accepted and appreciated ..

12th Issue

April 2018

# BIMarabia